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*************************** BIB-SECT
*
* REFERENCE   (C,68WASH,2,885,6803) PR
*              CONTRIBUTION.
*             (P,EANDC(E)-89,37,6802)
*             (J,NP/A,118,9,6805) FINA
*              MEASUREMENTS.
* AUTHOR      (H.K.VONACH,P.G.VONACH,H
* TITLE       -PRECISION MEASUREMENTS
*              OF (N,P),(N,A) AND (N,2
*              13.5 - 14.7 MEV NEUTRON
* INSTITUTE   (2GERMUN)
* N-SOURCE    (D-T   ) BOMBARDMENT OF A
*              DEUTERONS. A RANGE OF I
*              WERE USED BY VARYING TH
* FACILITY    (VDG   ) 400KEV VAN DE GR
*              FUR STRAHLENFORSCHUNG.
* METHOD      (ACTIV)  GAMMA PULSES EX
*              TA-180M WHERE BETAS WER
* PART-DET    (DG    ) DECAY GAMMAS.
* SAMPLE      .NATURAL MATERIALS. ME
*              SAMPLES WERE PLACED A
*              CORRESPONDING TO 30 T
*              ENERGY, AND SUBTENDE
*              DISTANCE OF 100MM
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* DETECTOR    (NAICR) 5X5INCH WELL CRYS
*             (PROPC) CH4 FLOW COUNTER
*              TA-180M.
* STATUS      .FROM TABLES IN CONFERENC
* HISTORY     (781017C) PDJ. RECOMPILED
*             (790219E)
*             (800115A) REACTION STRING
*              022 AND 023 CHANGED.
*             (800115E)
*             (800424A) DATA HEADINGS
*             (800603E)
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** END BIB-SECTION ******************
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*
* REACTION    (23-V-51(N,A)21-SC-48,,ST
*              RATIO TO THE 14.7 MEV CR
* STATUS      .PUBLISHED TABLE.
* HISTORY     (781018C) PDJ.
*             (790219E)
*             (800424A) DATA HEADINGS
*             (800603E)
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** END BIB-SECTION ******************
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** NO COMMON-SECTION ****************
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	EN MEV	EN-ERR MEV	DATA ARB-UNIT
1	13.6	0.075	0.820
2	13.7	0.075	0.836
3	13.8	0.075	0.852
4	13.9	0.075	0.867
5	14.0	0.075	0.885
6	14.1	0.075	0.902

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** END DATA-SECTION ****************
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NNDEN/29

NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER

NEA DATA BANK
BANQUES DE DONNÉES DE L'AEN

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NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER

NNDEN/29

This Newsletter summarises evaluation activity in the OECD area. It should be noted that work in progress and future plans cited in this document may be changed without notice: consequently, the Newsletter should neither be quoted as a reference in publications nor be listed in an abstract journal.

The information contained in this Newsletter concerns:

1. Evaluation work on particular nuclides;

2. Development of codes for the manipulation of data and for the calculation of cross sections;

3. Publications relevant to the neutron data field.

Contributions on evaluation activities have been received from:

Other information included in this issue:

January, 1981

1. NEW EVALUATIONS RECENTLY COMPLETED a), IN PROGRESS b), OR PLANNED IN THE NEAR FUTURE c)

Nuclide	Data Type	Energy Range	Pages			Nuclide	Data Type	Energy Range	Pages		
			a	b	c				a	b	c
D-2	many	< 20Mev			9	Pd-105	many			10	
Li-6	total,scat.	MeV	14			Pd-107	many			10	
Li-6	many			15		Pd-110	many			10	
Li-7	many			15		Ag-107	many		15		
Na	many		15			Ag-109	many		15		
Na-22	many				10	Sn-112	many				10
Al	γ prod	1MeV-20MeV		9		Cs	many		10		
Si	γ "	1MeV-20MeV		9		La	many		10		
Ar-38	many				10	Pr	many		10		
Ar-40	many				10	Gd	many			2	
Ca	γ prod	1MeV-20MeV		9		Tm-169	many	10^{-5}eV-20MeV			3
Ca	many	< 40MeV	15			Ta-181	spect(n,γ)	keV	6		
Cr	γ prod	1MeV-20MeV		9		Ta	γ prod	1MeV-20MeV		9	
Cr	many	20<En<50MeV		15		W	many	500keV-20MeV		2	
Cr	many	10^{-5}eV-20MeV	14			W	many			15	
Fe	γ prod	1MeV-20MeV		9		Pb	γ prod	1MeV-20MeV		9	
Fe-56	many	10^{-5}eV-20MeV		6		Bi-209	many	10^{-5}eV-20MeV		2	
Fe-56	many			15		Th-228	many		8		
Co-59	capt.	.025eV-15MeV	4			Th-230	many		8		
Ni	γ prod	1MeV-20MeV		9		Th-233	many		8		
Ni	many	20<En<50MeV		15		Th-234	many		8		
Ni-58	many				4	Pa-231	many	10keV-12MeV		2	
Ni	scat.		14			U-235	(n,xn), n,spect			2	
Cu	γ prod	1MeV-20MeV		9		U-237	many	10^{-5}eV-20MeV		2	
Se	spect(n,γ)	keV	6			U-239	many	10^{-5}eV-20MeV		2	
Br	spect(n,γ)	keV	6			U-235	(n,n'), (n,n'f) (n,2n)		6		
Kr	spect(n,γ)	keV	6								
Rb-85	many		15								
Rb-85	many	10^{-5}eV-20MeV		2		U-233	many	.025eV-30keV		9	
Rb-87	many		15			U-233	many			15	
Rb-87	many	10^{-5}eV-20MeV		2		U-235	many	resonance		15	
Nb-93	spect(n,γ)	keV	6			U-235	many	10^{-5}eV-20MeV	14		
Nb	γ prod	1MeV-20MeV		9		Np-237	many	5MeV-15MeV	4		
Rh-103	spect(n,γ)	keV	6			Pu-238	res.params.		4		

Nuclide	Data Type	Energy Range	Pages			Nuclide	Data Type	Energy Range	Pages		
			a	b	c				a	b	c
Pu-241	many	10^{-5}eV-20MeV		2							
Pu-239	(n,xn), n spect			2							
Pu-241	many	10keV-20MeV	1								
Pu-238	many			4							
Pu-239	(n,n'), (n,n'f) (n,2n)		6								
Am-242m	many	10^{-5}eV-20MeV	8								
Am-242	many	10^{-5}eV-20MeV	8								
Am-243	many			12							
Am-241	many	0.1MeV-15MeV		5							
Am-242	many	0.1MeV-15MeV		5							
Am-243	many	0.1MeV-15MeV		5							
Am-241	(n,n'), (n,n'f) (n,2n)		6								
Am-241	(n,γ)		6								
Cm-244	many	0.1MeV-15MeV		5							
Cm-246	many	< 10keV	6								
Cm-247	many	< 10keV	6								
Cm-248	many	< 10keV	6								
Cm-242	many	< 15MeV	6								
F.P.	many	.025eV-15MeV			9						
F.P.	capt.				10						
F.P.	decay data		12								
Heavy Z	decay data		12								

Service de Physique Neutronique et Nucléaire
Centre d'Etudes de Bruyères-le-Châtel

France

Names : O. BERSILLON, M. COLLIN, J.P. DELAROCHE, J. JARY, Ch. LAGRANGE, R. PERRIER, C. PHILIS, J. SALVY, G. SIMON, N. VERGES .

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Work recently completed and publications

- Ch. LAGRANGE, "Comments on some aspects of the use of optical statistical model for evaluation purposes", workshop on evaluation methods and procedures, Brookhaven, 22-25 Sept. 1980 .
- Ch. LAGRANGE, J. LACHKAR, G. HAOUAT, R.E. SHAMU[a], M.T. McELLISTREM,"Quadrupole moments and nucleon excitation strengths in even-A Sm isotopes", Nucl. Phys. A345 (1980) 193 .
- J.P. DELAROCHE, G. HAOUAT, J. LACHKAR, Y. PATIN, J. SIGAUD, J. CHARDINE, "Deformations, moments and radii of ^{182,183,184,186}W from fast neutron scattering", Phys. Rev. C20 (Nov. 80) .
- J. JARY, Ch. LAGRANGE, "Use of optical and statistical models for interpreting neutron cross sections at 0.7 MeV for ^{233}U, ^{235}U, ^{239}Pu", in report INDC(FR) 41/L .
- Ch. LAGRANGE, O. BERSILLON, D. MADLAND[b], "Evaluation of nuclear data for ^{241}Pu in the neutron energy range from 10 keV to 20 MeV", in report INDC (FR) 41/L .
- Ch. LAGRANGE, O. BERSILLON, "Coupled channel optical model calculations for evaluating neutron cross sections for odd-mass actinides", in report INDC (FR) 41/L .
- Ch. LAGRANGE, "On the usefulness of coupled channel calculations for actinide nuclei", in report INDC(FR) 41/L .

.../...

- Phenomenological and microscopic optical model analyses of low energy nucleons interaction with ^{93}Nb (Ch. LAGRANGE, A. LEJEUNE[c]) .

- Exact calculation of the penetrability of a two or three humped fission barrier in presence of damping . Application to the fission cross section of ^{231}Pa (J. GUILLOT) .

- Sensitivity of W neutron cross sections to target band mixing and β_6 deformation (J.P. DELAROCHE) .

Work in progress

- Coherent optical and statistical model calculations of neutron cross sections for Gd isotopes (J.P. DELAROCHE, Ch. LAGRANGE) .

- Calculation of neutron cross sections for some Pt isotopes (J.P. DELAROCHE) .

- Evaluation of neutron cross sections for ^{241}Pu in the energy range 10^{-5} eV - 20 MeV (O. BERSILLON, Ch. LAGRANGE, D. MADLAND[b]) .

- Calculations of neutron spectra from actinide (n,xn) reactions . Applications to ^{235}U and ^{239}Pu (J. JARY) .

- Evaluation of ^{231}Pa neutron cross sections from 10 keV to 12 MeV (J. JARY) .

- Evaluation of $^{237,239}U$ neutron cross sections from 10^{-5} eV to 20 MeV (C. PHILIS, J. JARY, Ch. LAGRANGE) .

- Coherent optical and statistical model calculations of neutron cross sections for ^{233}U (J. JARY) .

- Improvements of the interactive nuclear data evaluation file interface and maintenance system SYNOPSIS (M. COLLIN, D. COTTEN) .

- Evaluation of neutron cross sections for ^{85}Rb and ^{87}Rb from 10^{-5} eV to 20 MeV (A. PRINCE[d] , G. SIMON) .

- Evaluation of neutron cross sections and γ-ray production data for W isotopes in the energy range 500 keV - 20 MeV (E. ARTHUR[b], C. PHILIS, A.B. SMITH[e]) .

- Complete evaluation of neutron cross sections and γ-ray production from 10^{-5} eV to 20 MeV for ^{209}Bi (O. BERSILLON, C.A. PHILIS, N. VERGES) .

- Evaluation of neutron cross sections for ^{241}Pu in the energy range 10^{-5} eV - 20 MeV (O. BERSILLON, Ch. LAGRANGE, D. MADLAND[b]) .

.../...

- Carrying out of a Fortran code for generating multigroup γ-ray production cross sections (G. SIMON, R. PERRIER, C. PHILIS) .

Plans for the near future

- Complete re-evaluation of ^{169}Tm from 10^{-5} eV to 20 MeV (O. BERSILLON, C. PHILIS).

---

a) Western Michigan University (USA)

b) Los Alamos Scientific Laboratory (USA)

c) Centre de Recherches Nucléaires, Grenoble (France)

d) Brookhaven National Laboratory (USA)

e) Argonne National Laboratory (USA)

SECTION DE PHYSIQUE DES NEUTRONS RAPIDES

CENTRE D'ETUDES NUCLEAIRES DE CADARACHE

NAMES : H. DERRIEN, E. FORT, D. LAFONT, JP. DOAT

ADDRESS : Section de Physique des Neutrons Rapides (SPNR)
Centre d'Etudes Nucleaires de Cadarache
Boîte Postale N°1
13115 - SAINT-PAUL-LEZ-DURANCE - (France)

WORK RECENTLY COMPLETED :

- Improvement of the evaluation of ^{237}Np from 5 MeV to 15 MeV (E. FORT, JP. DOAT)
- Evaluation of resonance parameters for ^{238}Pu (H. DERRIEN)
- Evaluation of ^{59}Co (n,γ) cross-section from thermal energy to 15 MeV (H. DERRIEN)

WORK IN PROGRESS :

- Evaluation of a complete set of neutron cross-sections for ^{238}Pu (H. DERRIEN)
- Participation to the NEANDC exercise to intercompare the methods to derive average spacings (E. FORT, JP. DOAT)

WORK PLANED FOR THE NEAR FUTURE :

- Evaluation of a complete set of neutron cross-sections for ^{58}Ni (H. DERRIEN, D. LAFOND).

.....

KFK-KARLSRUHE

GERMANY

Names: F.H. Fröhner, B. Goel, H. Jahn, B. Krieg

Address: Institut für Neutronenphysik und Reaktortechnik
Kernforschungszentrum Karlsruhe
Postfach 3640
7500 Karlsruhe, West Germany

Work recently completed

- Reassessment of the relationship between shell-model, optical-model and R-matrix resonance states
  (F.H. Fröhner)

- Conception of improvements to existing parameter estimation procedures by application of Bayes' theorem with the twofold aim (1) to include prior information in a mathematically sound way, (2) to take correlated data uncertainties properly into account. An iteration scheme for non-linear parameter estimation was developed and encorporated into the codes FITACS (curve fitting to average cross section data) and STARA (simultaneous strength function and level spacing estimation by statistical resonance analysis).
  (F.H. Fröhner)

Work in progress

- Evaluation of ^{241}Am, ^{242}Am, ^{243}Am, ^{244}Cm in the range 0.1 - 15 MeV
  (B. Goel, H. Jahn)

- Assessment of available nuclear level density formulae for fission cross calculations
  (H. Jahn, A. Anzaldo)

- Study of combinatorial methods for level density calculations
  (A. Anzaldo, H. Jahn)

Work recently published

- "New Techniques for Multi-Level Cross Section Calculation and Fitting", Proc. Conf. on Evaluation Methods and Procedures, Brookhaven, Sept. 22 - 26, 1980; also: KfK 3081 (in print)

C.N.E.N. - DIVISIONE FISICA - LABORATORIO DATI NUCLEARI - Via Mazzini, 2
40138 BOLOGNA, ITALY - tel. 307562 - telex 610167 CNENBO I

Names: F. Fabbri, G. Maino, T. Martinelli, E. Menapace, M. Motta, G.C. Panini, G. Reffo, M. Vaccari, A. Ventura.

Work recently completed and publications

1. Theoretical Methods for Nuclear Data Evaluation. The BCS microscopic calculations of level density were extended to nuclei with odd number of neutrons and/or protons, on the basis of the single-particle level blocking due to unpaired nucleons. The results concerning nuclei in the mass range $90 \leq A \leq 250$ were published on "Il Nuovo Cimento", 57, 4, 427 - authors: G. Maino, E. Menapace, A. Ventura.

2. Actinide Data.
   In the frame of IAEA research agreement no. 2114/CF, evaluations for $Cm_{246,247,248}$ have been extended to the unresolved region (up to 10 keV) using the average parameters from the statistical analysis of the resonances based on maximum likelihood criteria applied to the proper statistical distributions.
   In the frame of the cooperation with CEA-Cadarache and KFK-Karlsruhe the complete evaluation up to 15 MeV was performed for Cm_{242}. In addition, (n,n'), (n,n',f), (n,2n) cross sections (including preequilibrium contributions) were estimated for U_{235}, Pu_{239} and Am_{241}. G. Maino, T. Martinelli, E. Menapace, M. Motta, A. Ventura.

   Isomeric ratio of neutron radiative capture have been calculated for Am-241 in the keV energy range. G. Reffo, F. Fabbri

   Capture Cross Section Calculations.
   Neutron radiative capture process has been considered for Rh_{103}, Nb_{93}, Ta_{181}, stable Kr, Se and Br isotopes, in the keV energy range. Complete γ-ray spectra have been calculated. G. Reffo, F. Fabbri.

   Work in progress.
   Preliminary results of Fe_{56} evaluation in the whole incident neutron energy range up to 20 MeV have been obtained. E. Menapace, M. Motta, G.C. Panini (in cooperation with CNEN laboratories involved in integral experiments on Fe_{56} and their analysis) and G. Reffo, F. Fabbri.

Work planned for the next future

An activity for the evaluation of Structural Materials is planned referring to recent differential data measurements and to the indications of integral experiment analyses from other CNEN laboratories (and possibly external ones).

Activity on Cross Section Data for Dosimetry is also planned.

G. Maino, T. Martinelli, E. Menapace, M. Motta, G.C. Panini, M. Vaccari, A. Ventura.

Contribution to Neutron Nuclear Data Evaluation Newsletter-29

Japanese Nuclear Data Committee
(Nuclear Data Center, JAERI)

Work Recently Completed and Publications:

(i) Neutron Nuclear Data Evaluation of Rare Isotopes of Thorium: ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th
T. Ohsawa and M. Ohta
Memoirs of the Faculty of Engineering,
Kyushu University,
Vol. 40, No. 3, 149 (1980)

Consistent set of neutron cross sections and $\bar{\nu}$p-values have been obtained for minor thorium isotopes ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th. Because no or very incomplete experimental information is available for these nuclei, evaluations based on semi-empirical systematic and model calculations are the only way to assess the nuclear data. In this work an attempt has been made to make use of the presently available newer information as much as possible. This paper describes the methods and results of evaluation of neutron nuclear data for ^{228}Th, ^{230}Th, ^{233}Th and ^{234}Th.

(ii) Evaluation of Neutron Nuclear Data for ^{242m}Am and ^{242g}Am
T. Nakagawa and S. Igarasi
JAERI - M 8903 (1980) (in Japanese)

Evaluation of neutron nuclear data for ^{242m}Am and ^{242g}Am was performed in the energy range of 10^{-5} eV to 20 MeV. For ^{242m}Am, resonance parameters were used up to 3.5 eV to represent the cross sections. Experimental data for the fission cross section were reproduced by spline functions up to 1.5 keV, and by a semi-empirical formula up to 20 MeV. Other cross sections were estimated by taking account of structure of the fission cross section below 1.5 keV, and were calculated with the optical and statistical models from 1.5 keV to 20 MeV. Cross sections for the (n,2n) and (n,3n) reactions were obtained with Pearlstein's method. Optical potential parameters were determined so that they might reproduce the neutron strength function and the compound nucleus formation cross sections suitable for the fission cross section calculation. For ^{242g}Am, there are no experimental data except thermal energy. The fission and capture cross sections were assumed to be 1/v form below 0.225 eV, and the elastic scattering cross section to be a constant. Above 0.225 eV, the fission cross section was estimated from that of ^{242m}Am, and the (n,2n) and (n,3n) reaction cross sections were assumed to be the same as those of ^{242m}Am. Other cross sections were calculated with the optical and statistical models. Angular distributions of elastically scattered neutrons were calculated with the optical model for both ^{242m}Am and ^{242g}Am. Those of the inelastic scattering, (n,2n) and (n,3n) reactions were assumed to be isotropic in the center-of-mass system. Furthermore, $\bar{\nu}$ was given for both states. Present results were compiled in the ENDF/B format.

Work in Progress:

(i) The thermal and resonance cross sections of ^{233}U were evaluated for JENDL-2. The cross sections below 1 eV are given as point-wise data and were evaluated by the use of the measured fission and capture cross sections. The resolved resonance parameters are given up to 100 eV. The cross sections from 100 eV to 30 keV are represented by the unresolved resonance parameters. (from Y. Kikuchi, JAERI)

(ii) Level density parameters are being determined for more than 100 nuclides, which are important from the viewpoint of the reactor application. These include the fertile and fissile materials, structure materials, and the fission products. The level density formula adopted is the Gilbert-Cameron type composite formula. The systematics of the determined parameters is examined, and is used to extrapolate the results to the nuclides with no experimental information. (from T. Yoshida, NAIG)

(iii) Analyses of gamma-ray production cross section for Al, Si, Ca, Cr, Fe, Ni, Cu, Nb, Pb and Ta have been carried out in the energy range from 1 MeV to 20 MeV with the multi-step evaporation model taking yrast level into consideration. The effects of yrast levels, level density parameters and gamma-ray strength functions were also examined. The preliminary results were published in JAERI-M 8163 and presented at Knoxville Conference GB-6 in October, 1979. (from M. Kawai, NAIG)

Work Planed for the Near Future:

(i) Reevaluation of neutron cross sections for about 80 FP nuclides is planned in the energy region from thermal to 15 MeV. (from M. Kawai,NAIG)

(ii) Evaluation of neutron nuclear data for deuterium is planned in the energy region up to 20 MeV. (from K. Shibata, Rikkyo University)

S. Igarasi

Nuclear Data Center
Tokai Research Establishment
Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken, Japan

November 12, 1980

NEUTRON NUCLEAR DATA EVALUATION NEWSLETTER-29

ECN-Petten - The Netherlands

1. Names

H. Gruppelaar, R.J. Heijboer, A.J. Janssen, H.A.J. van der Kamp and P. Nagel, Netherlands Energy Research Foundation (ECN), P.O. Box 1, 1755 ZG Petten, The Netherlands.
Telephone: (02246)-6262, telex: 57211 reacp nl.

2. Recent publications and preprints

/1/ Akkermans, J.M., H. Gruppelaar and G. Reffo, Angular distributions in a unified model of preequilibrium and equilibrium emission, Phys. Rev. C22 (1980) 73.

/2/ Gruppelaar, H. and J.M. Akkermans, Comparison of experimental and calculated neutron emission spectra and angular distributions, Paper contributed to the Symposium on Neutron Cross Sections from 10 to 50 MeV, Brookhaven, May 12-14, 1980 (also ECN-80-071).

/3/ Gruppelaar, H. and J.M. Akkermans, Comparison of experimental and calculated neutron emission spectra and angular distributions, ECN-84 (1980).

/4/ Nagel, P., INGRID, Interactive Graphical Display for Neutron Cross Sections, ECN-80-101 (1980) (Available upon request).

3. Work recently completed

The revised and adjusted RCN-3 evaluation of neutron cross sections for fission products (KEDAK format) has been supplemented with three natural elements: Cs, La and Pr. The total number of materials in this library amounts 30.

4. Work in progress

Re-evaluations for ^{105}Pd, ^{107}Pd and ^{110}Pd using recent experimental data.

5. Work planned for the near future

- Continuation of efforts in evaluation and adjustment of capture cross sections for about 20 fission-product nuclides.
- Further evaluation of neutron cross sections for nuclides in the primary cooling circuit of a LMFBR, i.e. for ^{22}Na, ^{38,40}Ar, ^{112}Sn.

6. Computer codes

The INGRID package /4/ is a system of library routines which is designed to process neutron cross section data with the help of an interactive graphics display terminal (TEKTRONIX-4014) connected to a CDC-CYBER-175 computer. The cross section data of the NEA Data Bank (NEA computational format) are stored in a data base management system (SIR), together with evaluated neutron cross sections from files available in ENDF/B or KEDAK format and group constants in the Russian ABN 26-group structure. The user may select a certain class of data from the data base for graphical intercomparisons.

NUCLEAR DATA EVALUATION NEWSLETTER

NO 29

The United Kingdom

1 PERSONNEL

The following graduate personnel are currently working on nuclear data evaluation:-

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i) Winfrith, Nuclear Data Group J S Story - M F James - R W Smith

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Winfrith Technology Branch - A L Nichols

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ii) Harwell, Electron Accelerator Group (Building 418)

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iii) Central Electricity Generating Board

Berkeley Nuclear Laboratory - B S J Davies - A Tobias

Address: Berkeley Nuclear Laboratories, CEGB Berkeley, Gloucestershire, GL13 9PB. Telephone Berkeley 451.

iv) British Nuclear Fuels Limited

Windscale and Calder Works - V Barnes

Address: Windscale and Calder Works, Sellafield, Seascale, Cumbria. Telephone Seascale 333.

2 WORK COMPLETED

The set of decay data for fission-products has been extensively revised by Davies and Tobias (CEGB, Berkeley Nuclear Labs). Measured half-lives have replaced theoretical estimates for many of the short-lived nuclides, and a number of measured beta and gamma decay spectra have been inserted where none existed previously. The new data set, known as UKFPDD-2 contains data on 855 nuclides, of which 736 are radioactive, 596 being in their ground states; beta and/or gamma spectra are given for 390 nuclides.

Evaluation of heavy element decay data has now been completed. The heavy element decay data library, UKHEDD-1, is compiled in ENDF/B5 format and contains comprehensive data, for 125 nuclides ranging from Hg-206 to Es-253, of the following kinds:

> half-life, Q-values, branching fractions, alpha decay data, beta-decay data (including transition classifications), gamma decay data (including internal conversion data).

Data uncertainties are included.

3 WORK IN PROGRESS

i) Efforts are being made to incorporate spontaneous fission data into the heavy element decay data library, UKHEDD-1.

ii) Preparations are being made for re-evaluation of the UKCNDC activation products decay data library; it is planned to extend this to include data for over 200 nuclides.

iii) Work continues at Harwell on production of a new neutron cross-section file for Am-243.

4 COMPUTER PROGRAMMES

The resonance cross-section code SIGAR7 has been implemented on the ICL-2976 computer, using the IBM compatible compiler, and is undergoing final tests. The programme allows for calculation of distant resonance correction terms (from resonance statistical data), and includes Doppler broadening routines; output can be written to tape in the format of the UK Nuclear Data Library. The code sets up its own energy mesh for representation of unbroadened and broadened cross-sections; an improved algorithm has been adopted for estimation of the "broadened total widths" or resonances. If required, Lamb's effective temperature is calculated, from the physical and Debye temperatures of the material, and is used in the Doppler broadening operation.

The BASIC interactive programme DEEBAR has been implemented on the ICL-2976 computer, and extensively revised. This programme is used to calculate mean resonance spacings from the energies of the first n resonances, with $n = 2, 3, \ldots$, using the Dyson-Mehta optimum statistic. For materials such as iron, for which the observed resonances extend nearly to 1 MeV, corrections are made for the expected energy dependence of the mean spacing. When the user has surveyed the table of DBAR values and typed in his preference, the level density paramters, of a back-shifted Fermi-gas model, are adjusted to fit. Tables showing the expected energy dependence and spin dependence of DBAR are presented. Expectation energies of the top negative energy resonances are estimated, using Dyson's "Conlomb gas" analogy. Finally, to exploit "the essentially crystalline character" of the level series, the resonance energies are listed alongside an energy ladder of evenly spaced rungs.

This is a formalisation of the old-fashioned staircase plot, and provides a clearer indication of the locations and numbers of missed resonances. A user's guide is in preparation.

5 PAPERS

A L Nichols, A Tobias, Improvements to the UKCNDC Decay Data Files Required for Decay Heat Calculations, UK Nuclear Data Forum, AEE Winfrith, December 1979.

A L Nichols, Heavy Element Decay Data; Progress Report for the IAEA Co-ordinated Research Programme on the Measurement and Evaluation of Transactinium Isotope Nuclear Decay Data (May 1980).

J S STORY

Reactor Physics Division
AEE Winfrith

November 1980

USA CONTRIBUTION TO NNDEN-29
VIA THE NATIONAL NUCLEAR DATA CENTER

Recent Publications

ANL/NDM-52 1980, February
"Neutron Total and Scattering Cross Sections of Lithium-6 in the Few MeV Region."
P. Guenther, A. Smith, and J.F. Whalen

ANL/NDM-53 1980, May
"Neutron Source Investigation in Support of the Cross Section Program at the Argonne Fast-Neutron Generator."
J.W. Meadows and D.L. Smith

ANL/NDM-54 1980, June
"The Nonelastic-Scattering Cross Sections of Elemental Nickel."
A.B. Smith, P.T. Guenther, and J.F. Whalen

BNL-NCS-51152 (ENDF-286)
"Evaluation of Natural Chromium Neutron Cross Sections for ENDF/B-V."
A. Prince and T.W. Burrows

BNL-NCS-51184 (ENDF-248)
"Evaluation of ^{235}U Neutron Cross Section and Gamma Ray Production Data for ENDF/B-V."
M.R. Bhat

UCRL-50400 Vol. 17, Part A, Rev. 2 1979, October
"Program LINEAR (version 79-1): Linearize Data in the Evaluated Nuclear Data File/Version B (ENDF/B) Format."
D.E. Cullen

UCRL-50400 Vol. 17, Part B, Rev. 2 1979, October
"Program SIGMA1 (version 79-1): Doppler Broaden Evaluated Cross Sections in the Evaluated Nuclear Data File/Version B (ENDF/B) Format."
D.E. Cullen

EVALUATIONS RECENTLY COMPLETED OR IN PROGRESS

Material	Laboratory	Status
^{6}Li	LASL	In Progress
^{7}Li	LASL	In Progress
Na	ORNL	Complete
Ca	ORNL	Completed up to 40 MeV
Cr	BNL	Extension up to 50 MeV in progress
^{56}Fe	ORNL	In progress
Ni	BNL	Extension up to 50 MeV in progress
$^{85,87}Rb$	BNL	Complete
$^{107,109}Ag$	BNL	Complete
^{NAT}W + isotopes	LASL,ANL	In Progress
^{233}U	LASL	In Progress
^{235}U	BNL	Resolved resonance region revision to agree with ENDF/B-V standards is in progress

The NEACRP ad-hoc Working Group on Evaluation Co-ordination

/OECD, Paris, 20th November, 1980/

This meeting was organised at the request of the NEA Committee on Reactor Physics (NEACRP) following discussions at their 23rd meeting in September 1980. Participants were nominated by NEACRP, and in addition to two members of NEACRP, included the chairman of the NEA Data Bank Committee and five nuclear data specialists.

At the NEACRP meeting, the objectives of this ad-hoc meeting had been defined as follows: to agree on a common format for evaluation files; to discuss common evaluation procedures; to establish a mechanism for selection of existing evaluations and co-ordination and review of new evaluations; in the absence of a timetable for general release of the ENDF/B5 file, to establish a common data file for use by participating countries.

1. Evaluated Data Format

There was consensus that the ENDF/B5 format would be most appropriate, in the interest of both wide use and possible future comparison with US evaluations. In some cases, restriction to a sub-set of the ENDF/B 5 structures may be adopted, however detailed discussions of the format were deferred for discussion in a sub-group of experts in the light of experience of the initial phases of file assembly.

2. Co-ordination of Data File assembly

The meeting agreed that a selection of existing evaluations to constitute a first data file should be made, and would be co-ordinated by a management group, reporting to NEACRP and the NEA Data Bank Management Committee, and composed of NEACRP representatives from France, Germany, UK and Japan and the Chairman of the Data Bank Management Committee together with appropriate data experts engaged in the work and those representing NEANDC. As far as possible meetings of this Management Group will be co-ordinated with other meetings of common interest. In 1981 further meetings will be held in association with the Topical Meeting of NEANDC on 8th April, at Cadarache, France, and with the 24th meeting of NEACRP, September 1980, at Winfrith, UK.

The Management Group will assign to appropriate data experts the task of recommending, as far as possible, a unique evaluation for particular elements. It was recognised that in this initial phase of construction of a common file from existing evaluations, there may be difficulties in choosing between alternative, but comparable, evaluations for certain isotopes. The selection of data should be based on the adequacy of the representation of all available experimental microscopic data, rather than on reactor integral measurements. Once a common file has been established, the Management Group will co-ordinate the distribution of new evaluation work amongst experts in the participating member countries, and will establish priorities taking into account current needs in reactor physics.

In the initial phase of assembly of a common file, the Data Bank will be asked to assist, both in the preparation of graphical comparisons of alternative evaluations and recent experimental data, and in the translation of chosen evaluations in the ENDF/B5 format. The meeting accepted that computing assistance could be necessary from laboratories in participating member countries in view of the additional load this work represents, and which will have to be absorbed in the Data Bank computing and manpower allocations for 1981.

The objective for 1981 is to create a common file containing evaluations for the Structural Materials, Primary and Secondary Actinides, and Fission Products. As a first step towards realisation of this objective, the responsibility for the choice of evaluations for the principal structural materials, iron, nickel and chromium was assigned to the following participants in the meeting:

Iron	Dr. M. Sowerby (UK)
Nickel	Dr. E. Fort (France)
Chromium	Dr. F. Fröhner (FRG)

3. The organisational framework for the project

The meeting emphasised that while the initiative for co-ordination of evaluation work had come from NEACRP representatives from the UK, France and Germany, all NEA member countries are welcome to participate, providing that they make a contribution to the project commensurate with their resources, and that they respect the spirit of co-operation. Two alternative formal frameworks within the NEA were discussed by the meeting.

The first would involve a submission to the OECD Steering Committee for Nuclear Energy, requesting that those member countries wishing to participate give a formal commitment to collaborate in a joint project.

The second would take advantage of the existing framework of the NEA Data Bank. All member countries of the NEA contributing to the Data Bank budget would be invited to participate, and the Management Group co-ordinating assembly and revisions of the common Data File would report to the Data Bank Management Committee.

The NEA Secretariat was requested to investigate the merits of these two possibilities and to prepare appropriate recommendations and draft alternative submissions for presentation either to the Steering Committee for Nuclear Energy or the NEA Data Bank Committee.

GENERAL RECOMMENDATIONS TO CONTRIBUTORS

Contents and Presentation

These newsletters are meant to be informal : nevertheless, we think it useful to give some recommendations concerning the contents, presentation, distribution, etc.

The Newsletters are concerned with evaluation activities - with evaluation work itself and with computer programs useful for evaluation.

Experimenters should be careful to distinguish between "evaluating" all the good data and the more customary process of simply analysing their own measurements.

When compiling your contribution, the following headings may serve as a guide :

1. Names, address, telephone number, telex code.
2. Work recently completed and publications.
3. Work in progress - please give names of physicists doing each evaluation.
4. Work planned for near future, i e., work expected to start within six months (before publication of the next newsletter).
5. Computer programs for : nuclear data file operations - nuclear data analysis - nuclear model calculations.

Any note or report mentioned should be available on request to another evaluator for his own use but not necessarily for widespread copying and re-distribution. The distribution list of each newsletter will be attached to it.

Contributions should be forwarded typewritten in single spacing, as the newsletters will be produced directly from this typescript.

IMPORTANT NOTE

Future Neutron Nuclear Data Evaluation Newsletters will be distributed on 1st June and 1st December each year.

Evaluators are requested to send their contributions by :

15th May and 15th November

to : NEA DATA BANK
91191 GIF SUR YVETTE CEDEX
France

DISTRIBUTION LIST

AUSTRALIA	W. Gemmell
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UNITED STATES	R. Benjamin, R.C. Block, C. Bowman, C.L. Cowan, H. Goldstein, J. Hardy, C.R. Head, P. Hemmig, W.B. Henderson, N. Holden, R. Howerton, B.R. Leonard, C.R. Lubitz, D. Mathews, C.W. Maynard, H. Motz, NNCSC Library, E.H. Ottewitte, O. Ozer, N.G. Paik, R.W. Peelle, E.R. Pennington, F.G. Perey, RSIC, G.L. Rogosa, R.E. Schenter, A.B. Smith, N. Steen, W.A. Wittkopf, P. Young.

CROSS SECTION COMPUTATIONAL FORMAT

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ATOMIC No. Z	MASS No. A	REACTION CODE	STANDARD	METHOD	FLAGS	LABORATORY	DATE	EXFOR No.	NEUTRON ENERGY	ERROR	LEVEL ENERGY	ANGLE	ERROR	CROSS SECTION	ERROR	STANDARD	ERROR
023051NA3LAC						HAN	6120904003	1.6000E+07	4.0000E+05					3.1700E-02	6.9740E-03		
023051NA3LAC						HAN	6120904003	1.7100E+07	4.0000E+05					3.7000E-02	7.7700E-03		
023051NA3LAC						HAN	6120904003	1.8000E+07	4.0000E+05					3.0900E-02	6.4890E-03		
023051NA3LAC						HAN	6120904003	1.9400E+07	3.0000E+05					2.4200E-02	4.8400E-03		
023051NA3LAC						HAN	6120904003	1.9600E+07	3.0000E+05					2.6000E-02	5.9800E-03		
023051NA3LAC						AEP	7930523006	1.7970E+07	2.7000E+05					1.9700E-02	1.3000E-03	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.7180E+07	3.8000E+05					2.0300E-02	1.3000E-03	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.6050E+07	4.3000E+05					1.9300E-02	1.2000E-03	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.4770E+07	2.5000E+05					1.7400E-02	9.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.4610E+07	2.1000E+05					1.6800E-02	9.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.4360E+07	1.5000E+05					1.6000E-02	8.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.3680E+07	3.5000E+05					1.4100E-02	7.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.3410E+07	1.6000E+05					1.3200E-02	7.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.2790E+07	2.9000E+05					1.1500E-02	7.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.2230E+07	1.4000E+05					1.0100E-02	6.0000E-04	1.1750E-01	3.0000E-0
023051NA3LAC						AEP	7930523006	1.1400E+07	8.0000E+05					5.3000E-03	7.0000E-04	1.1750E-01	3.0000E-0

NEUTRON DATA SERVICES FROM NEA DATA BANK

This cover illustrates the three formats now in use for answering user requests for experimenta neutron data. These data are compiled and exchanged with the three other neutron data centres in "EXFOR" format, and stored at the Data Bank together with the CINDA bibliography in an integrated data base.

NEA Data Bank makes selective searches in this data base for users in its member countries, and supplies either listings structured as in EXFOR of data and associated comments (experiment description and bibliography) or data on tape in one of the computational formats shown on this cover, accompanied by a listing of comment information. NNDC (Brookhaven) supplies data in similar formats to its customers in USA and Canada.

Users are asked to specify their requests in as precise and selective a form as possible : this avoids the delay and expense of sending out quantities of data much larger than the requester really wants. Data sent out to users are accompanied by documentation or other explanation of the formats used, and a list will be sent on request of all the other files of neutron and non-neutron nuclear data, experimental or evaluated, available from the Data Bank.

RESONANCE PARAMETERS COMPUTATIONAL FORMAT

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ATOMIC No. Z	MASS No. A	LABORATORY	DATE	EXFOR No.	RESONANCE ENERGY	ERROR	PARITY	(SPIN)	MOMENTUM	TOTAL WIDTH Γ	ERROR $\Delta\Gamma$	FLAG	NEUTRON WIDTH Γ_n	ERROR $\Delta\Gamma_n$	FLAG	FISSION WIDTH Γ_f	ERROR $\Delta\Gamma_f$	FLAG	GAMMA WIDTH Γ_γ	ERROR $\Delta\Gamma_\gamma$	FLAG
026056KFK				70062037	0008	1.6900E+05	1.0000E+03		0				8.70E+02	7.00E+01							*
026056KFK				70062037	0008	1.8800E+05	1.0000E+03		0				3.43E+03	2.70E+02							*
026056KFK				70062037	0008	2.2000E+05	1.0000E+03		0				1.47E+03	8.50E+01							*
026056KFK				70062037	0009	2.2790E+04	7.0000E+01		1						G						*
026056KFK				70062037	0009	3.4250E+04	1.0000E+02		1						G						*
026056KFK				70062037	0009	3.6690E+04	1.1000E+02		1						G						*
026056KFK				70062037	0009	3.8380E+04	1.2000E+02		1						G						*
026056KFK				70062037	0009	4.6040E+04	1.4000E+02		1						G						*
026056KFK				70062037	0009	5.2200E+04	1.6000E+02		1						G						*
026056KFK				70062037	0009	5.3600E+04	1.6000E+02		1						G						*
026056KFK				70062037	0009	5.5500E+04	2.0000E+02		1						G						*
026056KFK				70062037	0009	5.9250E+04	1.8000E+02		1						G						*
026056KFK				70062037	0009	6.3450E+04	1.9000E+02		1						G						*
026056KFK				70062037	0009	7.2500E+04	5.0000E+02		1						G						*
026056KFK				70062037	0009	7.6900E+04	5.0000E+02		1				8.60E+00	6.00E-01	G						*
026056KFK				70062037	0009	8.0800E+04	3.0000E+02		1				1.80E+01	4.00E+00	G						*
026056KFK				70062037	0009	9.2600E+04	3.0000E+02		1				6.00E+00	2.00E+00	G						*
026056KFK				70062037	0009	9.6100E+04	3.0000E+02		1				5.00E+01	8.00E+00	G						*
026056KFK				70062037	0009	1.0240E+05	3.0000E+02		1				7.00E+01	1.20E+01	G						*
026056KFK				70062037	0009	1.0580E+05	3.0000E+02		1						G						*
026056KFK				70062037	0009	1.1260E+05	3.0000E+02		1						G						*
026056KFK				70062037	0009	1.5100E+05	1.0000E+03		1						G						*
026056KFK				70062037	0009	1.5300E+05	1.0000E+03		1						G						*
026056KFK				70062037	0009	1.6300E+05	1.0000E+03		1						G						*
026056KFK				70062037	0009	1.7940E+05	1.2000E+03		1						G						*
026056KFK				70062037	0009	1.8070E+05	1.2000E+03		1						G						*
026056KFK				70062037	0009	1.9510E+05	1.0000E+03		1				1.00E+02	2.40E+01	G						*